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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/072,527	02/05/2002	Thomas B. Bolt	Q02-1037-US1/ 11198.82	2908

7590 10/12/2004

ROBERT A SALTZBERG
MORRISON AND FOERSTER LLP
425 MARKET STREET
SAN FRANCISCO, CA 94105

EXAMINER	
VERBRUGGE, KEVIN	

ART UNIT	PAPER NUMBER
2188	

DATE MAILED: 10/12/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/072,527	BOLT ET AL.	
	Examiner	Art Unit	
	Kevin Verbrugge	2188	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 August 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13 and 30-54* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13 and 30-54* is/are rejected.

7)☒ Claim(s) *35-38* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

This final Office action is in response to the amendment filed 8/17/04 which amended several claims, canceled claims 14-29, and added new claims 39-54. Claims 1-13 and 30-54 are pending. All rejections and objections not repeated below are withdrawn. The art rejections are repeated and made final because the arguments were not persuasive. The arguments are addressed following the repeated rejection.

Claim Objections

Claims 35-38 are objected to because of the following informalities:

in claim 35, last line, after "rows", --are-- should be inserted.

in claim 36, last line, after "rows", --are-- should be inserted.

in claim 37, last line, after "rows", --are-- should be inserted.

in claim 38, next to last line, after "rows" second occurrence, --are-- should be inserted.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 5-7, 13, 30, 32-34, 39-42, and 44 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent 5,666,538 to DeNicola who discloses a disk power manager for network servers.

Regarding claims 1, 30, 41, and 42, DeNicola shows the claimed storage system as network server 110 in Figs. 1, 2, and 10.

He does not explicitly show the claimed housing but it is inherent in his device as the structure which securely holds the disk drives and other components of his network server 110. Such housings are required to maintain the proper positioning of the disk drives and other components during shipping and normal operations.

He shows the claimed disk drives as disk drives 240, 241, and 242.

He shows the claimed controller that controls the disk drives as SCSI disk controller 210. Furthermore, he teaches that at least two of the disk drives are in different modes during the transfer of data to at least one of the disk drives since he teaches that each disk is controlled independently of the other disks. In other words, at any given point in time, each disk can be spun up (active) or spun down (inactive), regardless of the state of the other disks in the system (see column 5, lines 1-2, column 6, lines 50-55, column 7, lines 14-15 and 32-42, column 8, lines 20-25 and 63-65, column 9, lines 5-8 and 63-64, column 10 lines 17-18, 31-33, and 47-65, column 11, lines 11-12, and column 12, line 14).

Regarding claims 5-7, 32-34, 39, 40, and 44, DeNicola explicitly teaches that disk 242 could be spun up while disks 241 and 240 are spun down at column 13, lines 14-19.

Regarding claim 13, DeNicola shows the claimed combination in Fig. 1 with a host system comprising any of the user terminals 120, for example.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 2, 3, 4, 8-12, 31, and 35-38, are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,666,538 to DeNicola who discloses a disk power manager for network servers.

Regarding claims 2 and 31, DeNicola does not explicitly teach that his controller directs data to a first subset of disk drives and a second subset of disk drives simultaneously as claimed.

However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use DeNicola's controller to direct data to a first subset of drives and a second subset of drives simultaneously since he teaches that "the disk

power manager could easily be adapted for use with redundant arrays of inexpensive disks (RAIDs)" at column 13, lines 30-32, and one of the most basic RAID arrangements is RAID 1, where one set of drives is mirrored on another set of drives and both sets are written simultaneously. RAID 1 provides high performance and high reliability, since the two sets can be read independently (high performance) and since a complete duplicate of the data exists even if one of the sets of drives fails (high reliability).

Regarding claim 3, DeNicola does not disclose that his device has at least one subset with at least five disk drives as claimed. However, the number of disk drives included in a subset of disk drives is an obvious matter of design choice, with the number of disks used being affected by things like cost, size, availability, capacity, speed, etc.

Regarding claim 4, DeNicola does not mention using parity protection in his device. However, since he mentions RAIDs as mentioned above, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use one of the RAID levels which use parity protection since the parity protection levels of RAID require less storage space than the fully redundant RAID level 1 (mirroring).

Regarding claims 8-12, and 35-38, the actual number of spun down drives at any one time is an obvious matter of design choice, where the designer needs to balance

the performance losses of a greater number of drives being inactive (taking a finite time to become activated once called on) with the power and heat costs of a greater number of drives being active at any one time (since drives use more power and generate more heat when active). Furthermore, the claimed arrangements are all an obvious matter of design choice. The number of rails, rows, and drives are all a matter of design choice, as are the number of drives that are in any mode at any given time.

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Claims 43 and 45-54 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,666,538 to DeNicola in view of U.S. Patent 5,560,022 to Dunstan et al .

Regarding claims 43 and 45, DeNicola does not teach that the number of disk drives in any particular mode depends on the temperature of the disk drives in the write mode. He teaches that the number of disk drives in any particular mode depends on the disk access history and the desire for power savings. The fewer disk accesses there are, the sooner the disks will be spun down. Also, the greater the desire for power savings, the sooner the disks will be spun down. If there is more disk activity, the disks will remain spun up for a longer period of time. Similarly, if the desire for power savings is not as great, the disks will remain spun up for a longer period of time. These

variables are controlled by DeNicola's monitoring hardware and processes and are adjustable depending on user preferences.

Dunstan teaches, at column 6, lines 38-40, that another reason to spin down disks besides power savings is heat reduction.

DeNicola's device clearly spins down disks to save power, and a secondary benefit of saving this power is reducing the heat generated by the disk. Some of the power used in spinning the disk, moving the heads, and overcoming the friction of the head on the disk and in the air creates heat which raises the temperature of a disk while it is operating. Under continuous operation, a disk continuously generates more heat, raising its temperature. As the temperature rises, component failures become more likely, and so it was known to remove the heat using heat sinks, air movement, liquid cooling, etc. If all of a drive's heat removal measures cannot keep the temperature from rising over a critical temperature (perhaps specified by the manufacturer), then device protection measures must be taken to avoid suffering disk damage or failure. One of the protection measures that was known in the prior art at the time of the invention was spinning down the disk to let it cool off. This is clearly taught by Dunstan when he says that a disk requires "time to spin-up before it can be accessed after having been spun-down to reduce power consumption or heat."

It would have been obvious to one of ordinary skill in the art at the time the invention was made to spin down disks that are becoming too hot in DeNicola's device, taking them out of write mode, since this would protect them from heat-related damage and failure. Furthermore, in the same way that saving power produces indirect savings

in reduced minimum power supply size, reduced minimum fan size, etc., reducing heat produces indirect savings in reduced minimum heat sink size, reduced minimum fan size, reduced component spacing distances, etc.

Regarding claims 46-54, the actual number of spun down drives at any one time is an obvious matter of design choice, where the designer needs to balance the performance losses of a greater number of drives being inactive (taking a finite time to become activated once called on) with the power and heat costs of a greater number of drives being active at any one time (since drives use more power and generate more heat when active). Furthermore, the claimed arrangements are all an obvious matter of design choice. The number of rails, rows, and drives are all a matter of design choice, as are the number of drives that are in any mode at any given time.

Response to Arguments

On page 12 of the amendment, third paragraph, Applicant argues that DeNicola "appears to specifically manage power consumption during access of data from the network server 110 (read operations), but does not disclose management of power consumption during transfer of information to the network server 110 (write operations)."

In the next paragraph, Applicant cites from DeNicola that "data accesses are made to the disk drives 240 via the data line 238. During data accesses to the disk drive 240, the disks 215 are physically spinning under the control of the disk drive motors 230. As disks 215 spin, magnetic media rotates past a read/write head (not shown),

which allows the read/write head to read data stored within the magnetic media in quick succession." Applicant cites DeNicola at column 6, lines 6-24, however the passage is actually at column 6, lines 11-18.

While this passage mentions that a read/write head is used to read data, nowhere does DeNicola teach that the read/write head only reads data. In fact the very mention of the read/write head implies that it reads data from and writes data to the disk.

Additionally, nowhere else in DeNicola is there any teaching at all that only reads are performed. Generally DeNicola uses the term "accesses" when referring to an interaction with a disk. Therefore it is instructive to determine what DeNicola means by the term "accesses". After completing a thorough search of the reference's use of the term, the Examiner can find no restriction to the operation of reading, leading him to conclude that DeNicola intends the generic term "accesses" to include reading and writing.

Furthermore, on multiple occasions, DeNicola mentions tracking reads and writes with separate counters. This separate tracking of reads and writes clearly indicates that reads and writes both occur and both are used to determine activity levels of the disks. Information from both counters is used to determine when to spin disks down. Clearly data is written to the disks at some points in time since DeNicola tracks writes with a separate counter. At column 7, line 62 through column 8, line 7, DeNicola teaches that "... the disk monitor polls the device driver to obtain the count value stored within read and write count registers within the device driver.... The registers are used to

separately keep track of the number of read and write accesses made to the respective disk drives. That is, each counter is incremented upon the occurrence of a read or a write access." (emphasis added). Clearly then, writes are made to the disks, which is logical since any data that is ever read from a disk must have previously been written to the disk.

DeNicola clearly teaches monitoring writes for considering when to spin down his disks. Therefore the argument to the contrary is not persuasive.

On page 14, fourth full paragraph, Applicant argues that DeNicola does not teach that drives can be in an idle state during which the disks are spun up but no data transfer is occurring between a host system and the disk drive.

On the contrary, DeNicola clearly teaches using monitoring time periods to count the number of accesses during a certain time and then spinning down disks based on the accesses within that time period, clearly suggesting that there are times when no accesses are being made and the disk is still spinning (because the time period has not yet expired and the number of accesses made during that time period hasn't been considered yet). The alternative, which Applicant seems to suggest, is that every disk of DeNicola would spin down immediately after completing every data transfer, so that there would never be a time that the disk is spinning without transferring data. This strains credulity and is simply erroneous when DeNicola's monitoring periods are considered.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

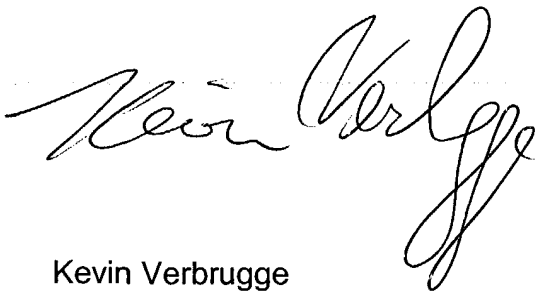
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning a communication from the Examiner should be directed to the Examiner by phone at (703) 308-6663.

Any response to this action should be labeled appropriately (serial number, Art Unit 2188, and After-Final, Official, or Draft) and mailed to Commissioner for Patents, Washington, D.C. 20231, faxed to (703) 872-9306, or delivered to Crystal Park 2, 2121 Crystal Drive, Arlington, VA, 4th Floor Receptionist.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for

published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197.



Kevin Verbrugge
Primary Examiner
Art Unit 2188